

WHAT IS CLAIMED IS:

1. A waterproof seal feeding machine for feeding cylindrical waterproof seal members to a predetermined fitting position on an axis line of an electric wire to fit a seal member over an outer periphery of an end portion of the electric wire, the waterproof seal feeding machine comprising:

a seal cavity defining member including a pair of holders which oppose to each other with regard to the axis line and which open and close at the fitting position, the holder pair being so arranged as to define a seal cavity for receiving the seal member at the fitting position in a locked state in which the seal member is prevented from moving toward the electric wire when the holder pair close at the fitting position;

a passage forming member which forms a feeding passage extending along the axis line at such a position as to oppose an end portion of the electric wire with regard to the fitting position in order to feed the seal member into the seal cavity defined by the holder pair with such a posture as to receive the electric wire by the compressed air;

a locking mechanism which locks the seal member in cooperation with the holder pair of the seal cavity defining member and which unlocks the seal member after insertion of the electric wire; and

a control unit which controls the seal cavity defining member and the locking mechanism so that the seal member fed into the seal cavity is brought to a locked state.

2. The waterproof seal feeding machine according to claim 1, wherein

the feeding passage is formed in the passage forming member and extends coaxially along the electric wire,

the waterproof seal feeding machine further comprising a pair of lock members which oppose to each other with regard to the axis line, the lock members open and close at the fitting position, the lock members having respectively enclosing recesses which enclose the seal member held in the seal cavity when the lock members close to each other.

3. The waterproof seal feeding machine according to claim 1, wherein

the passage forming member is formed with the feeding passage, a lock member passage merging with a leading end of the feeding passage, and a slider passage being communicated with a merging portion which is formed by the feeding passage and the lock member passage being communicated with the seal cavity,

the locking mechanism includes a lock member which is reciprocatably located in the lock member passage formed in

the passage forming member so as to push and lock the seal member fed into the seal cavity,

the waterproof seal feeding machine further comprising:

a slider which reciprocatably and slidably moves in the slider passage in such a way that the slider gets inside and retracts away from the feeding passage, and

an urging member which urges the slider toward the feeding passage, wherein

the slider includes a main body which fills the merging portion of the feeding passage and fills the lock member passage when the main body moves into the feeding passage, a feeding passage defining surface which is continuously connecting the feeding passage and a tip of the lock member passage, and a cam surface which receives the force from a tip of the lock member so that the slider main body moves beneath the feeding passage against an urging force of the urging member when the lock member is moved toward the holder pair.

4. The waterproof seal feeding machine according to claim 1, wherein

the locking mechanism includes a rod-like lock member which reciprocatably slides inside a lock member passage formed in the passage forming member extending coaxially along the axis line,

the passage forming member is formed with the feeding passage which is so configured as to branch out from the lock member passage at a downstream end in a seal feeding direction and to extend in a direction oblique to the axis line, and

the control unit controls the locking mechanism to actuate in such a manner as to retract the lock member away from the seal cavity in response to feeding of the seal member through the feeding passage.

5. The waterproof seal feeding machine according to claim 1, wherein

the passage forming member is formed with the feeding passage coaxially along the axis line,

the locking mechanism includes a rod-like lock member in the form of an arc shape for reciprocating through a lock member passage formed in the passage forming member, the lock member passage being branched out from a downstream end of the feeding passage in a seal member feeding direction and extending in an arc shape, and

the control unit controls the locking mechanism to actuate in such a manner as to retract the lock member away from the seal cavity in response to feeding of the seal member through the feeding passage.

6. The waterproof seal feeding machine according to claim 1, wherein the control unit controls the holder pair in such a manner that a clearance is defined between the holder pair for exhaling the compressed air while the seal member is held in the seal cavity, and controls the seal cavity defining member so that the holder pair close after holding the seal member in the seal cavity.

7. The waterproof seal feeding machine according to claim 1, wherein the holder pair and the passage forming member are arranged at such a position as to define a clearance between the holder pair and the feeding passage for exhaling the compressed air.

8. The waterproof seal feeding machine according to claim 1, wherein

the passage forming member includes a support shaft extending in such a direction as to move the holder pair reciprocatably with regard to the axis line which open and close at the fitting position, and

the holder pair is so mounted on the support shaft as to open and to close,

the waterproof seal feeding machine further comprising a holder driving mechanism detachably attached to the holder pair.

9. The waterproof seal feeding machine according to claim 8, wherein the passage forming member and the locking mechanism are integrally provided on a common base member.

10. The waterproof seal feeding machine according to claim 1, wherein

each of the holder pair is formed with a through-opening in a bottom of the seal cavity, the through-opening having a rhombus shape in cross section, and

the control unit controls the seal cavity defining member to actuate the holder pair in such a manner that a clearance defined by the holder pair in a closest position thereof is set in conformity to an outer diameter of the electric wire.

11. The waterproof seal feeding machine according to claim 10, wherein

the locking mechanism includes a lock member which pushes the seal member in the seal cavity, and

the lock member is formed with a recess for enclosing a part of the seal member in the seal cavity to align the seal member coaxially along the axis line of the electric wire.

12. The waterproof seal feeding machine according to claim 1, further comprising an air compressor which supplies

the compressed air into the feeding passage, wherein the control unit controls the air compressor in such a manner as to feed the compressed air into the feeding passage so that the compressed air tightly urges the seal member in a bottom of the seal cavity at least during a time from feeding the seal member into the seal cavity to locking the seal member by the locking mechanism.

13. A method for fitting cylindrical waterproof seal members over end portions of an electric wire, comprising:

a seal cavity defining step of defining a seal cavity for receiving a cylindrical waterproof seal member at a predetermined fitting position on an axis line of an electric wire;

a feeding step of feeding the seal member into the seal cavity at the fitting position with such a posture as to receive the electric wire by the compressed air;

a locking step of bringing the seal member to a locked state in the seal cavity in which the seal member is prevented from moving toward the electric wire;

an inserting step of inserting the electric wire into the seal member in the locked state; and

a releasing step of releasing the seal member from the locked state after the inserting step.

14. The method according to claim 13, wherein the seal cavity is defined by moving a holder pair toward each other to close the fitting position with regard to the axis line, the holder pair are slightly moved away from each other to define an air exhaling path for exhaling the air penetrated in the seal cavity through the feeding passage while the seal member is held in the seal cavity.

15. An electric wire processing apparatus including a fitting process of fitting seal members over end portions of an electric wire, the apparatus comprising:

a waterproof seal feeding machine which feeds cylindrical waterproof seal members to a predetermined fitting position on an axis line of an electric wire to fit the seal member over an outer periphery of an end portion of the electric wire, the waterproof seal feeding machine comprising:

a seal cavity defining member including a holder pair which oppose to each other with regard to the axis line and which open and close at the fitting position, the holder pair being so arranged as to define a seal cavity for receiving the seal member at the fitting position in a locked state in which the seal member is prevented from moving toward the electric wire when the holder pair close at the fitting position;

a passage forming member which forms a feeding passage extending along the axis line at such a position as to oppose an end portion of the electric wire with regard to the fitting position in order to feed the seal member into the seal cavity defined by the holder pair with such a posture as to receive the electric wire by the compressed air;

a locking mechanism which locks the seal member in cooperation with the holder pair of the seal cavity defining member and which unlocks the seal member after insertion of the electric wire; and

a control unit which controls the seal cavity defining member and the locking mechanism so that the seal member fed into the seal cavity is brought to a locked state.

a fitting mechanism which fits the seal member over the end portion of the electric wire by reciprocating the end portion of the electric wire along the axis line with regard to the seal cavity;

at least a pair of stripping blades which strip off an insulative sheath of the end portion of the electric wire where the seal member fits; and

a pair of brackets which support the stripping blade pairs for operatively opening and closing a clearance defined by the stripping blade pair, whereby

the brackets support the holder member pairs of the seal cavity defining members and the stripping blades in such a manner that the holder member pairs and the stripping blade pair open and close simultaneously.

16. The apparatus according to claim 15, further comprising:

an electric wire feeding path which is defined in parallel to the axis line of the electric wire for feeding the electric wire of a long length in a certain direction;

an electric wire retrieving/length measuring device which is disposed on the wire feeding path for retrieving the electric wire along the wire feeding path by a certain length, while measuring the length of the electric wire to produce size-adjusted wires; and

a cutting device which cuts the electric wire fed on the wire feeding path by the certain length at a certain position, wherein

the waterproof seal feeding machine, the fitting mechanism, the stripping blade pairs, and the bracket pairs are provided in two sets, one of the sets being disposed on a downstream side of the wire feeding direction with regard to the wire cut position, the other one of the sets being disposed on an upstream side of the wire feeding direction with regard to the wire cut position, and the sets of the

waterproof seal feeding machine, the fitting mechanism, the stripping blade pair, and the bracket pair are operated in synchronism with each other to fit the seal members over the end portions of the cut wires.

17. An electric wire processing apparatus including a waterproof seal feeding machine for feeding waterproof seal members to a predetermined fitting position on an axis line of an electric wire to fit the seal members over outer peripheries of end portions of the electric wire, the apparatus comprising:

a seal cavity defining member including a holder pair opposed to each other with regard to the axis line which open and close at the fitting position to feed the seal member to the fitting position, a seal cavity being defined for receiving the seal member at the fitting position in a locked state in which the seal member is prevented from moving toward the electric wire when the holder pair are moved toward each other to close the fitting position;

a fitting mechanism which fits the seal member over the end portion of the electric wire by reciprocating the end portion of the electric wire along the axis line with regard to the seal cavity;

at least a pair of stripping blades which strip off an insulative sheath of the end portion of the electric wire

where the seal member is fitted; and

a pair of brackets which support the stripping blade pair for operatively opening and closing a clearance defined by the stripping blade pair, whereby

the bracket pair supports the holder member pair of the seal cavity defining member, and the stripping blade pair in such a manner that the holder member pair and the stripping blade pair are integrally opened and closed.

18. The apparatus according to claim 17, further comprising:

an electric wire feeding path which is defined in parallel to the axis line of the electric wire for feeding the electric wire of a long length in a certain direction;

an electric wire retrieving/length measuring device which is disposed on the wire feeding path for retrieving the electric wire along the wire feeding path by a certain length, while measuring the length of the electric wire to produce size-adjusted wires; and

a cutting device which cuts the electric wire fed on the wire feeding path by the certain length at a certain position, wherein

the waterproof seal feeding machine, the fitting mechanism, the stripping blade pair, and the bracket pair are provided in two pairs, one of the pairs being disposed on a

downstream side of the wire feeding direction with regard to the wire cut position, the other one of the pairs being disposed on an upstream side of the wire feeding direction with regard to the wire cut position, and the downstream-side pair and the upstream-side pair of the waterproof seal feeding machine, the fitting mechanism, the striping blade pair, and the bracket pair are operated in synchronism with each other to fit the seal members over the end portions of the cut wires.